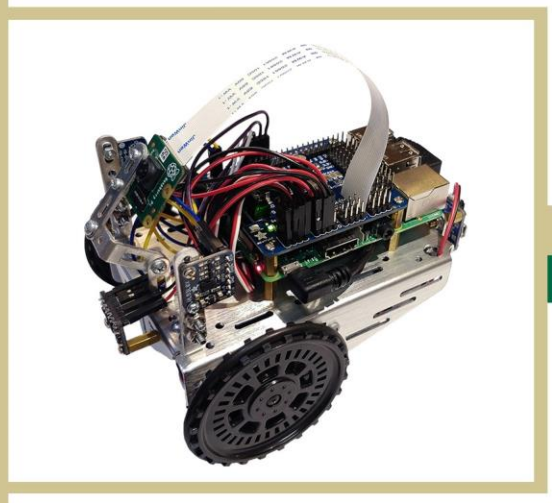
Control of Mobile Robots



The PiBot

Build Guide

Conner Wulf

BUILD GUIDE

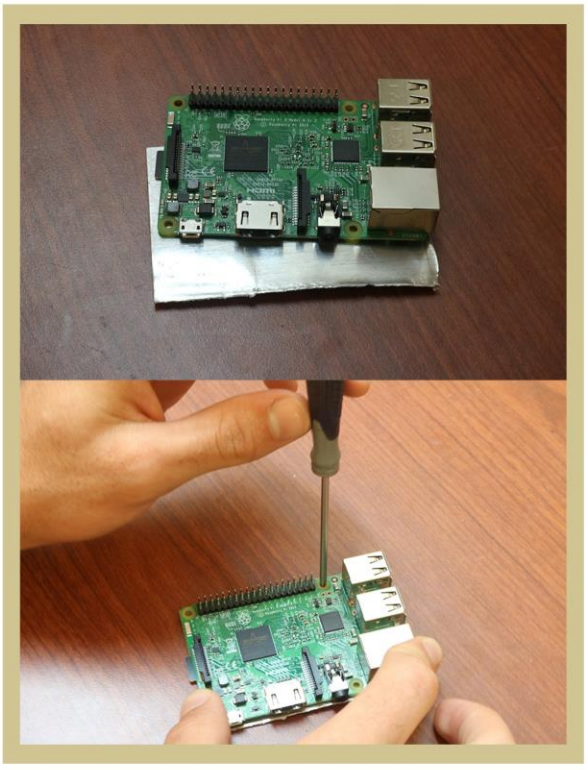
Difficulty: *Intermediate*

1: Prepare The Chassis

Parts:
You can find the entire list of parts we used on the PiBot components 2018 file. This Step you will also need, a sheet of metal(size of the Pi), a drill with a 1/8in bit. Along with the Pi, chassis and rubber gasket.

1.01

Put the Raspberry Pi on top of the sheet metal. Using A small pen or screw driver, carefully mark where to drill on the metal. Then drill the 4 corners marked on the metal. Make sure the Pi does not shift when marking so the Pi will line up correctly later.



We used a drill template because we needed to make a lot of robots. You could also make the marks on the chassis and then drill

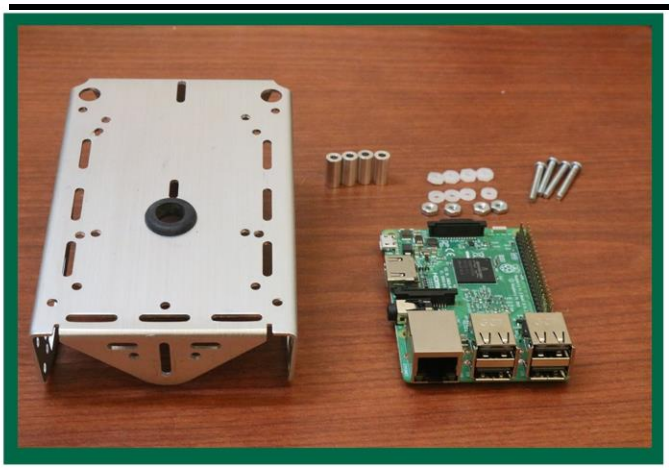
1.02

After the template is made, lay it on top if the chassis. When deciding where to drill, we suggest you line them up so that the back of the Pi is close to the back of the chassis. Once a spot is chosen, clamp down the template metal and drill the holes.

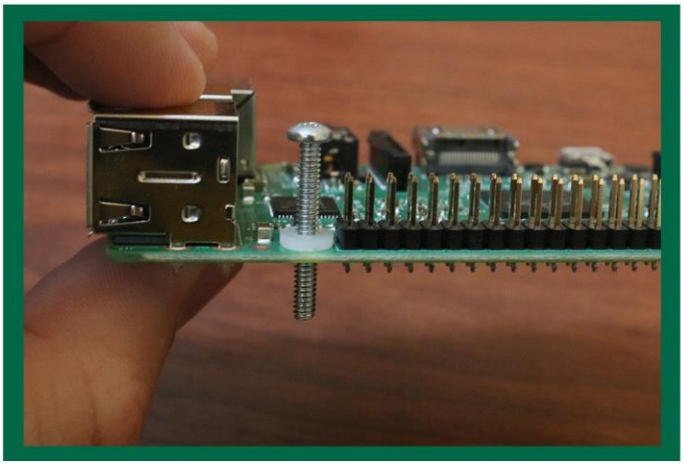
1.03

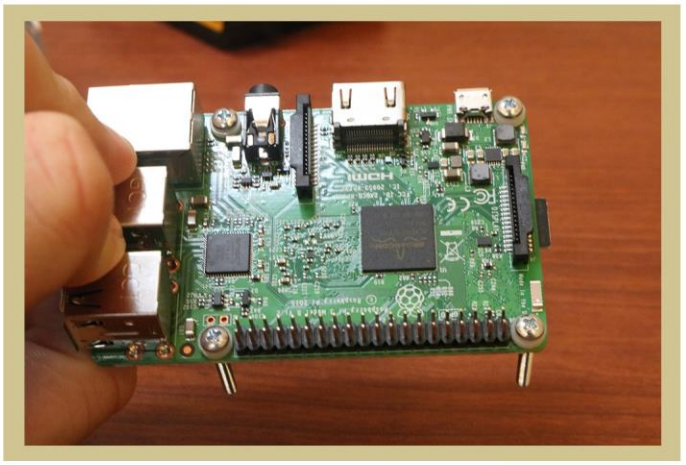
Put the rubber stopper in the hole in the center of the chassis. Make sure to do this before you mount the Raspberry Pi or it will be harder to access.

2: Mount The Pi to The Chassis



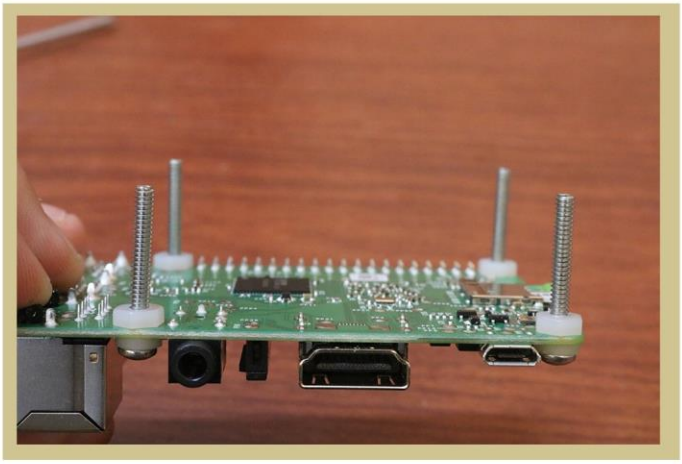
Parts:
In this step you will need the Raspberry Pi, Standoffs, the pre-drilled chassis. as well as, a small phillips screw driver.

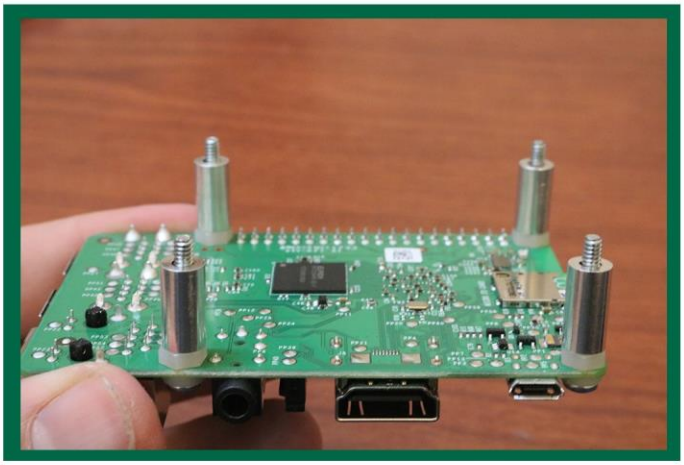




2.01

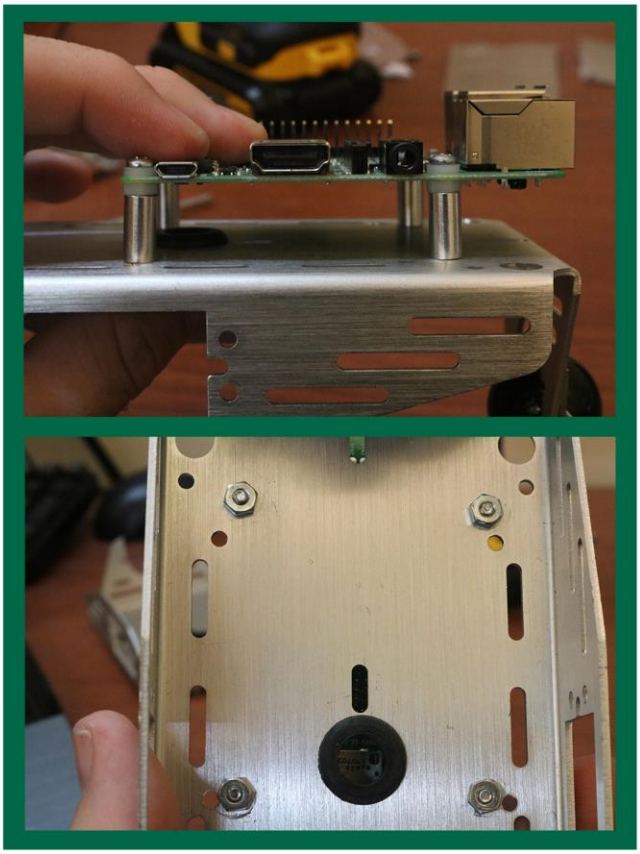
Take one of the screws and place a small plastic washer on it. Then thread the screw through one of the Pi's four mounting holes. Do this for every hole, making sure there is a washer between each screw and the Pi.





2.02

Take one of the plastic bolts and put them on the other side screws used on the Pi. Make sure they are snug as it will help with the stability of the Pi once mounted.
Then add the metal spacers to the screws.

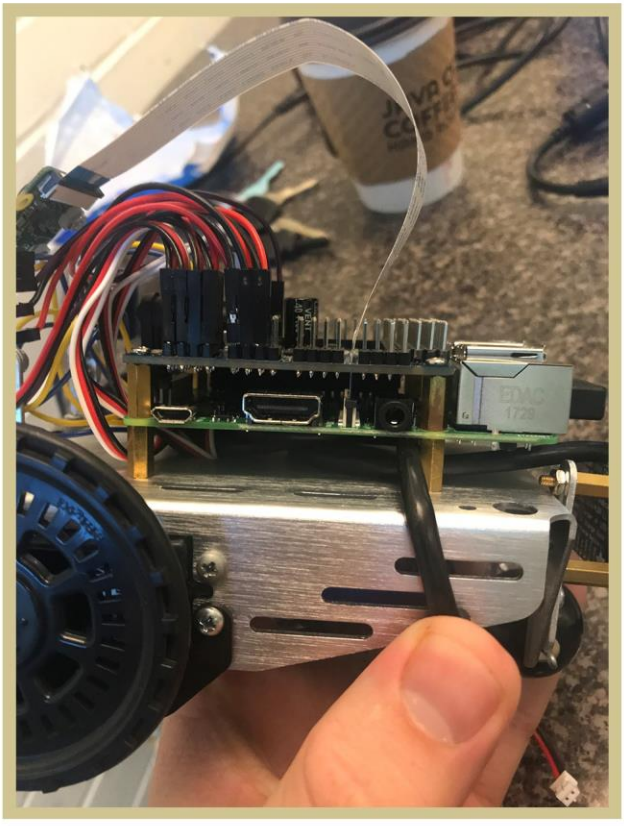


2.03

While holding the Pi upside-down, line the holes you drilled with the screw on the Pi. Then, Take the metal bolts and fasten the Pi to the chassis.

2.04

Alternate Design:
For our final design, we decided to use the brass standoffs shown to the right. They proved to be more sturdy and reliable. However, both methods will work.

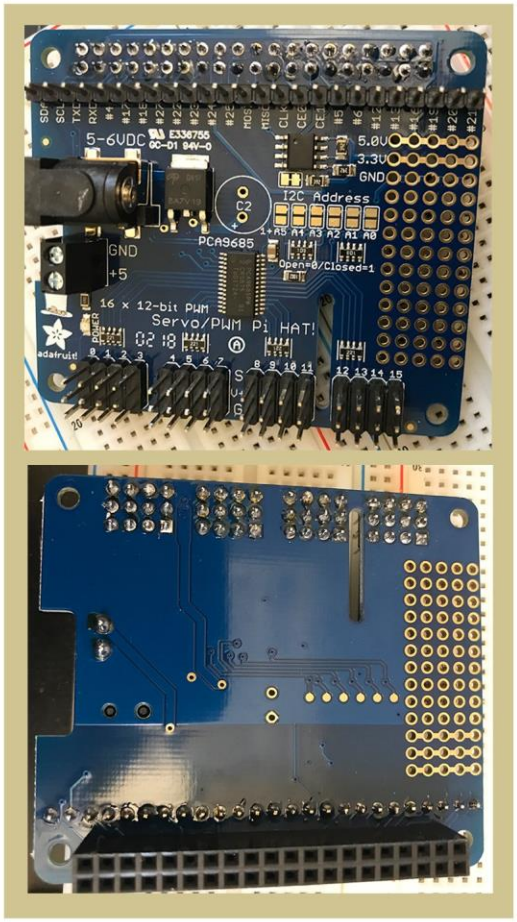


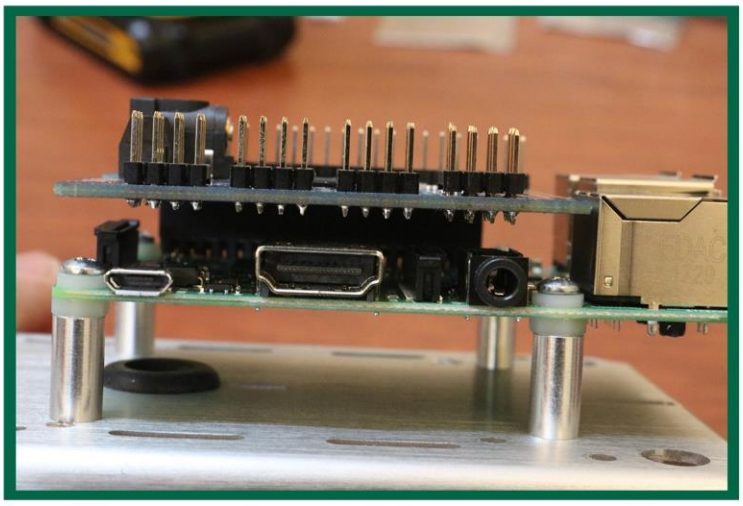
3: Soldering

Parts:
In this step you will need the Servo Hat, Sensor, and the power boost as well as a soldering iron.

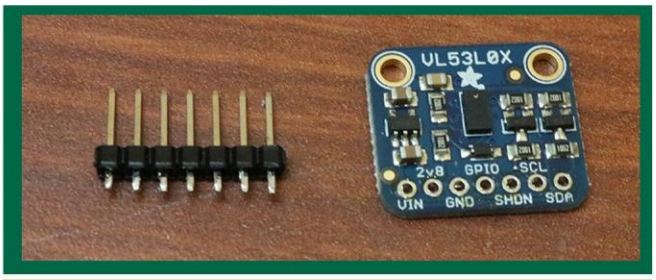
3.01

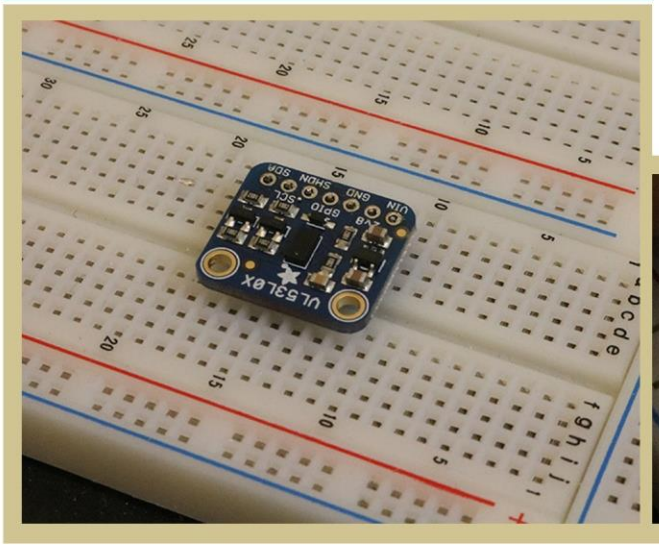
Solder the Servo Hat as shown to the right. Note the GPIO pin connector must be on the bottom while the rest of the pins are on the top. We used a breadboard to help keepthe pins straight.





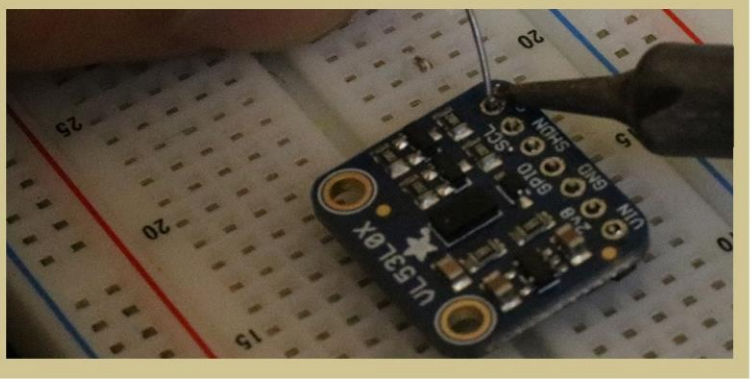
Once soldering is done, attach the servo hat to the top of the mounted Pi using the GPIO pins, as shown here. If using the brass standoffs, you can also add them here for more stability.





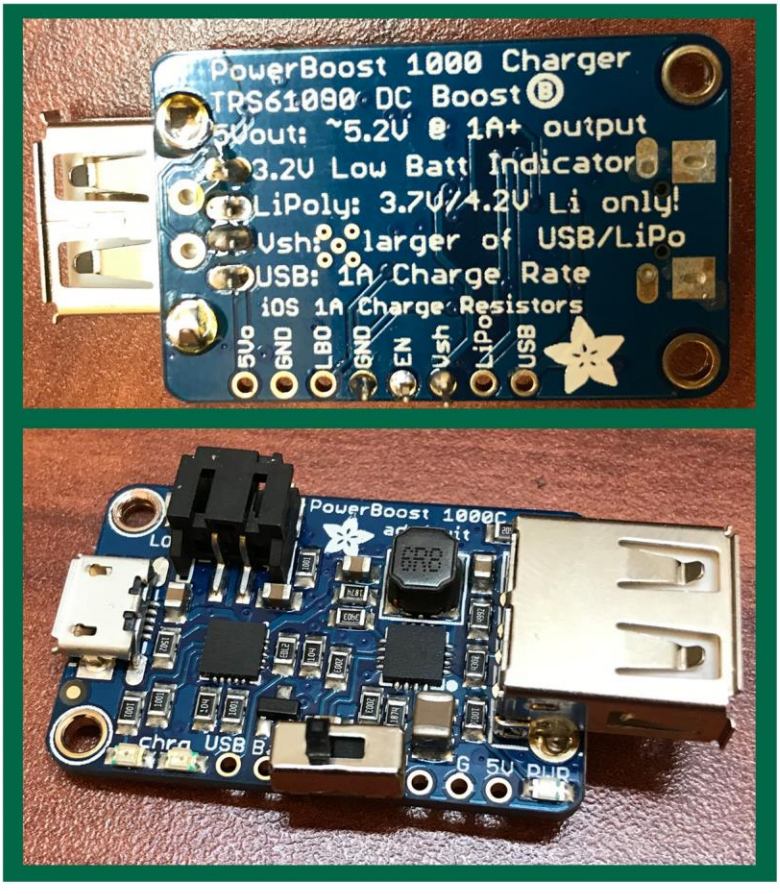
3.02

The next soldering step it to solder the laser sensors. Using the same method with the breadboard, solder the seven contacts to the sensor. Repeat this for all 3 sensors.

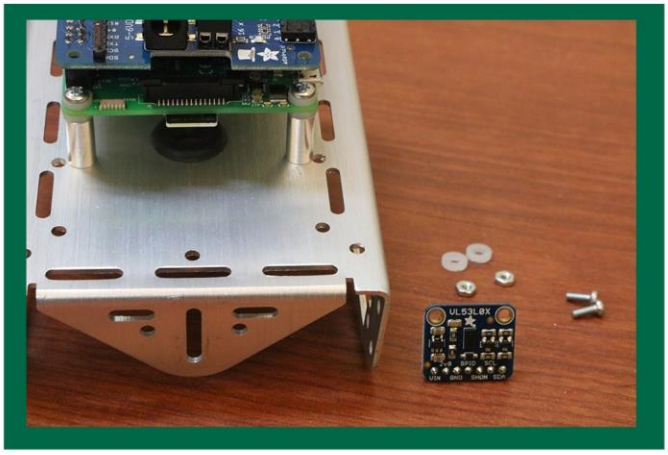


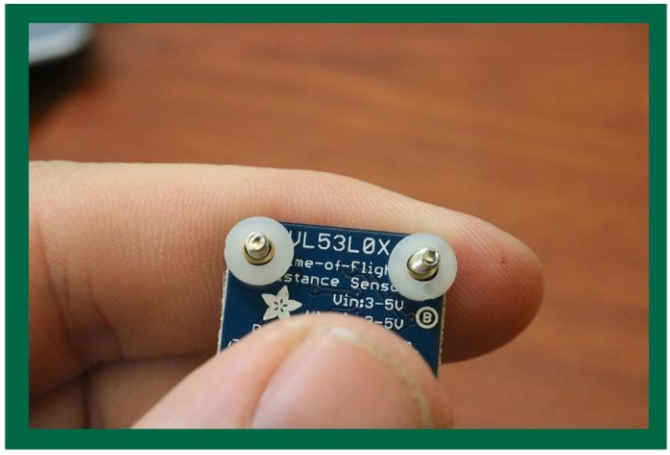
3.03

The last soldering step is to solder the power boost. Solder the USB contacts to the chip and then solder the on/off switch to the chip with the middle pin of the switch assigned to the enable input. The EN pin on the power boost stands for Enable.



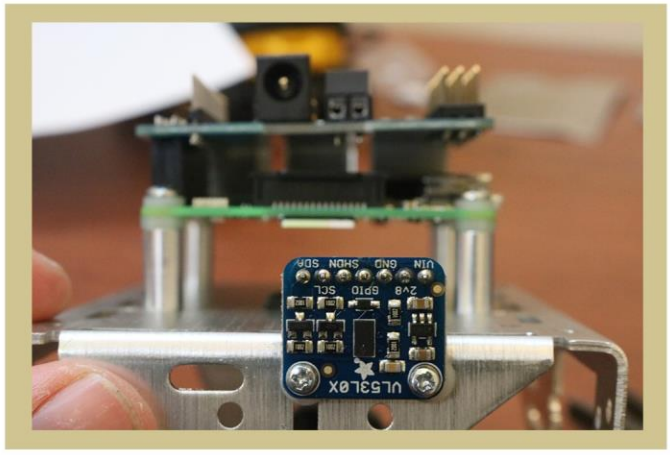
4: Mounting The Sensors





4.01

To attach the front sensor to the PiBot, thread two small screws through the laser and then add a plastic washer. Then thread the screws on the laser through the chassis and bolt it down. Make sure the laser is upside-down as seen below. Brass standoff may also be used.

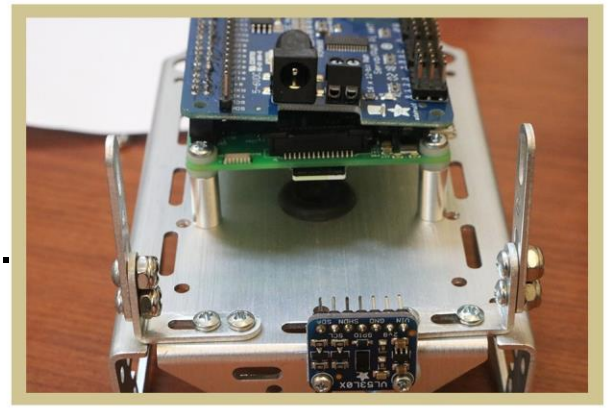


4.02

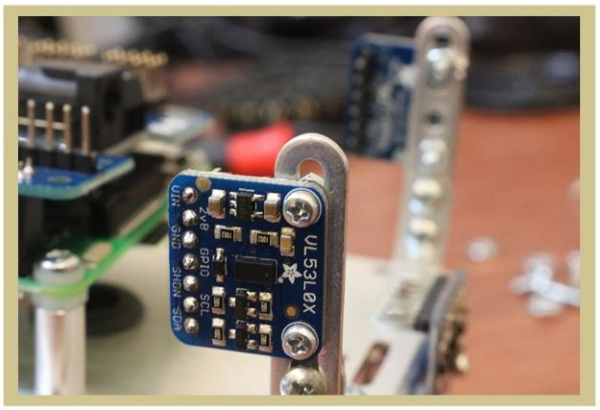
To setup the left and right sensors make sure you have the parts in the picture to the left.

- Fasten the angle and straight brackets together as shown in the top picture.

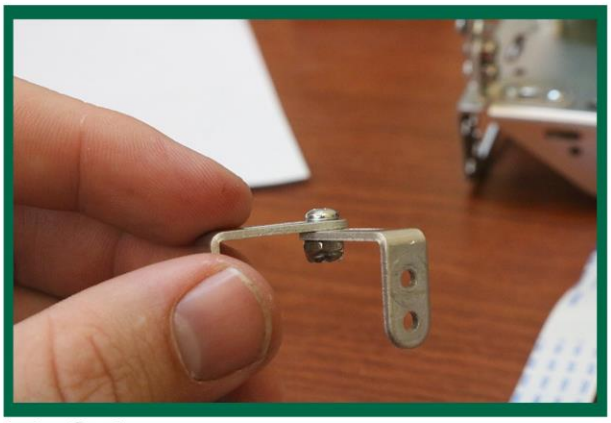
- Fasten the two brackets made to the chassis as shown in the next two pictures.



- Lastly, fasten a laser sensor on each side, making sure the sensors pins are facing the inside of the robot.

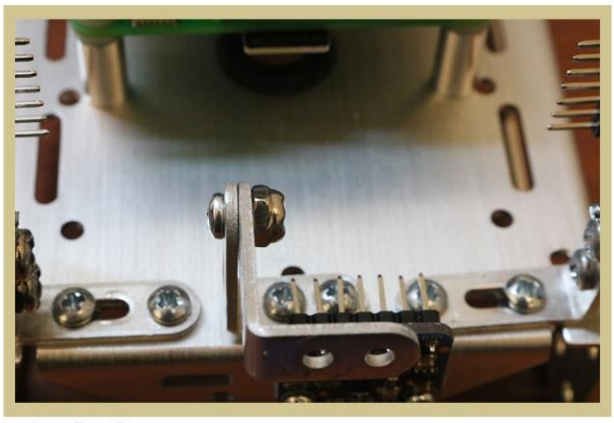


5: Mounting The Camera



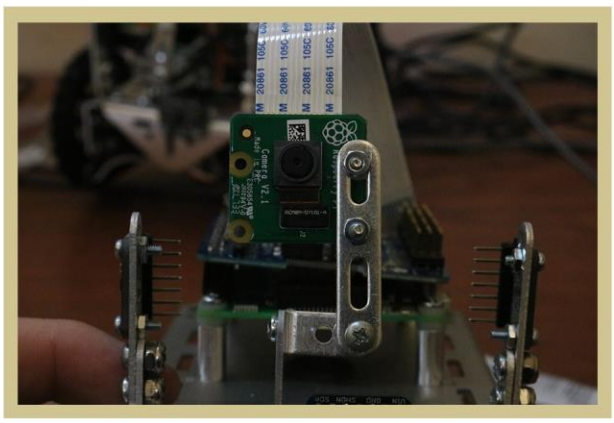
5.01

To setup the bracket for the camera, take two right angle brackets and fasten them together on the top hole of the longer side.



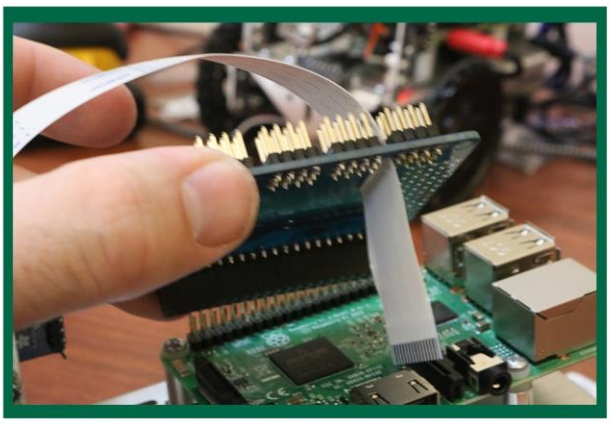
5.02

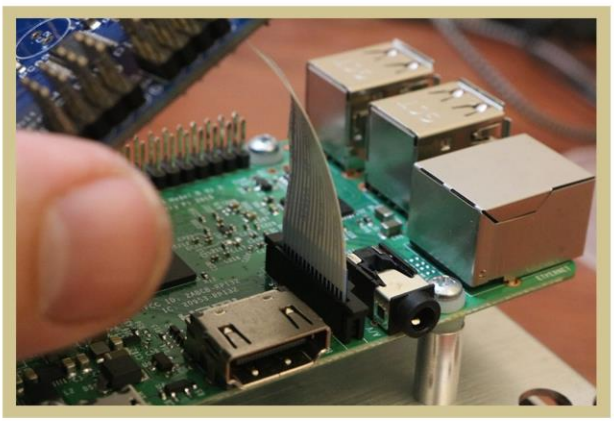
Take the new bracket and fasten it to the chassis, underneath the front sensor



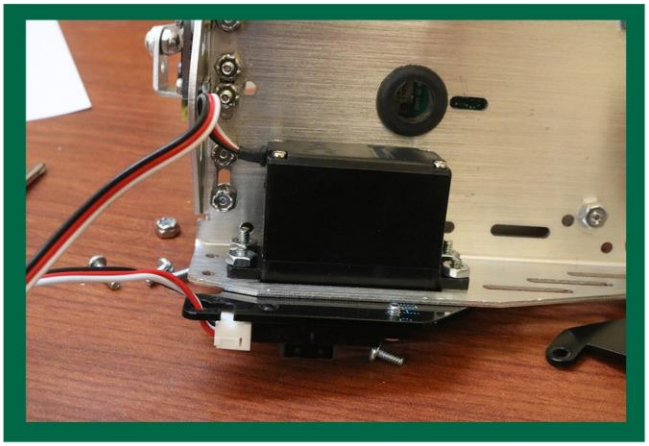
5.03

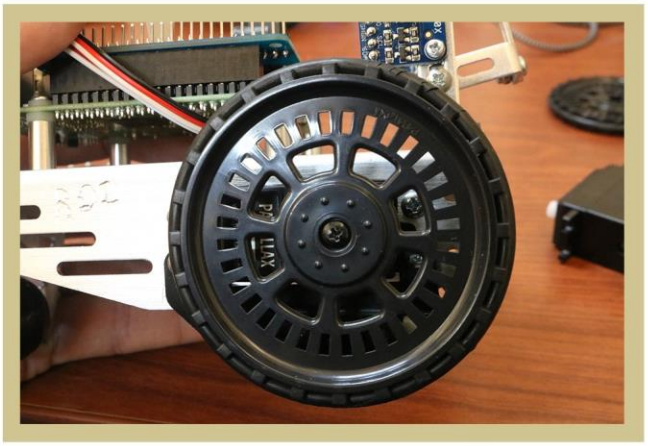
Using one straight bracket, mount the camera to the Pi as shown above. Make sure to put a washer between the camera and metal.
Then, hook up the camera to the Pi, as shown on the right.



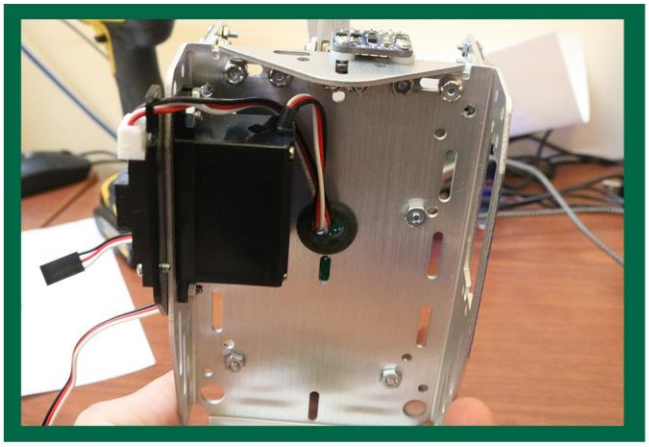


6: Installing the Servos & Encoders

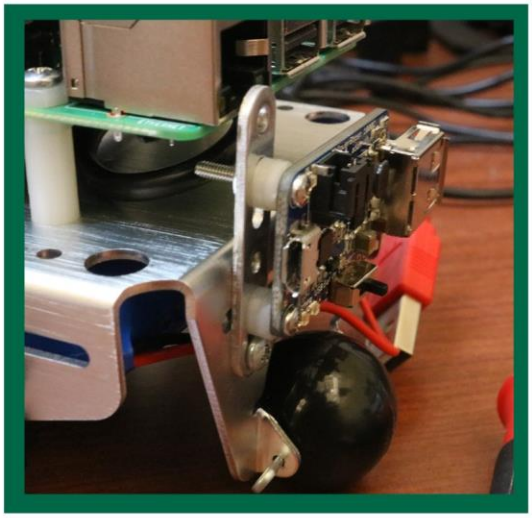




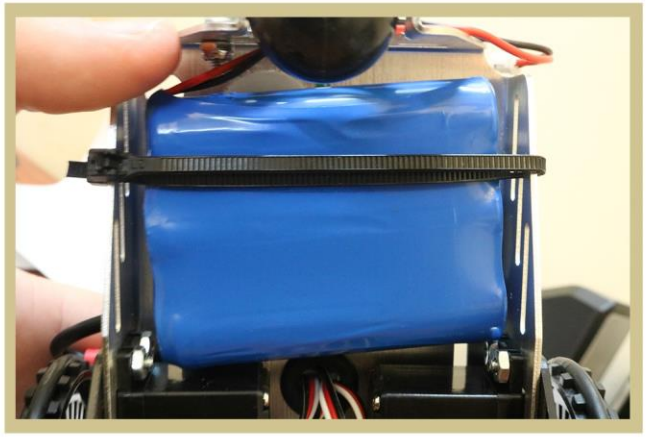
Insert a servo and encoder and bolt them down as seen in the picture above. Thread the wires through the small rubber gasket on the chassis. Finally screw the wheel on the servo. Repeat for other.



7: Installing the Power Boost & Battery



Using washers and a long metal bracket, mount the soldered power boost to the chassis as shown in the picture.



Fix the LiPo battery to the bottom of the robot in a way to make sure it is snug. We used a zip tie for ours.